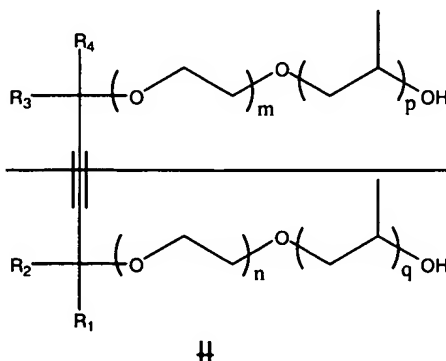
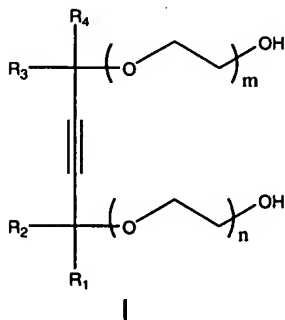


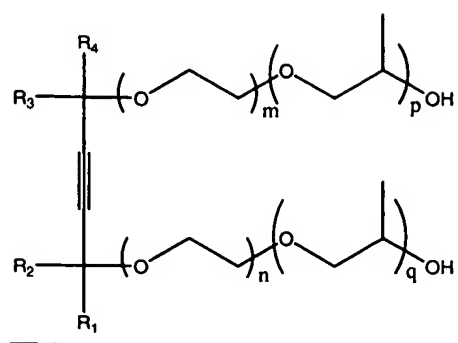
Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

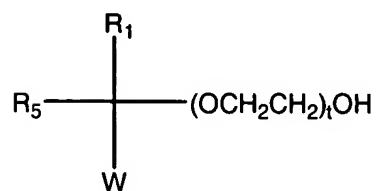
Listing of Claims:

1. (Currently Amended) A method for reducing the number of defects during the manufacture of semiconductor devices, the method comprising:
providing a substrate comprising a photoresist coating;
exposing the substrate to a radiation source to form a pattern on the photoresist coating;
applying a developer solution to the substrate to form a patterned photoresist coating;
optionally rinsing the substrate with deionized water; and
contacting the substrate with a process solution comprising at least one aqueous solvent, at least one non-aqueous solvent that is miscible in an aqueous solvent, and about 10 ppm to about 10,000 ppm of at least one surfactant having the formula (I), (II), (III), (IVa), (IVb), (V), (VI), (VII), (VIII), (IXa), (IXb), (IXc), (Xa), (Xb), (Xc), or (Xd):

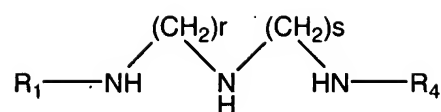




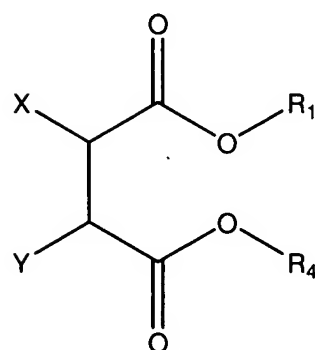
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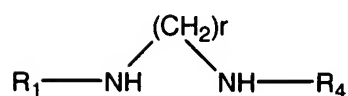
III



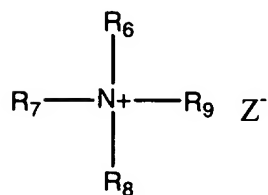
IVa



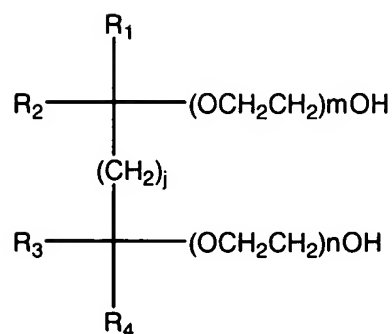
V



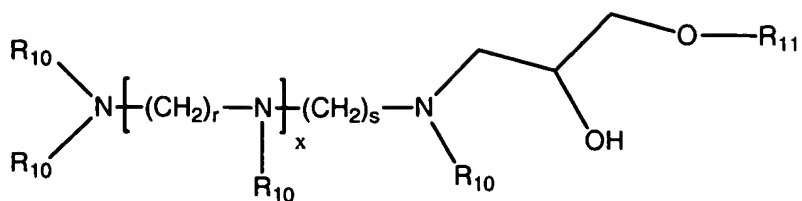
IVb



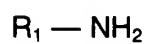
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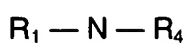
VII



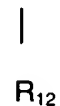
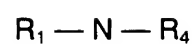
VIII



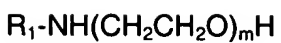
IXa



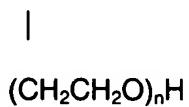
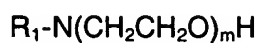
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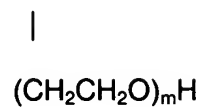
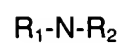
IXc



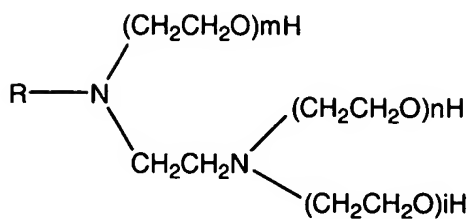
Xa



Xb



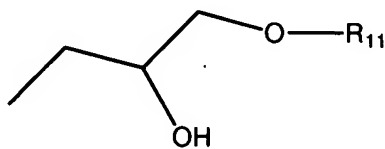
Xc



Xd

wherein R, R₁, R₄, and R₁₂ are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; R₂ and R₃ are each independently a hydrogen atom

or an alkyl group having from 1 to 5 carbon atoms; R_5 is a straight, a branched, or a cyclic alkyl group having from 1 to 10 carbon atoms; R_6 is a straight, a branched, or a cyclic alkyl group having from 4 to 16 carbon atoms; R_7 , R_8 , and R_9 are each independently a straight, a branched, or a cyclic alkyl group having from 1 to 6 carbon atoms; R_{10} is independently H or



a group represented by the formula

; R_{11} is a straight, a

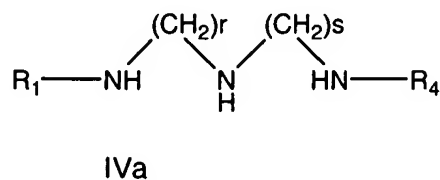
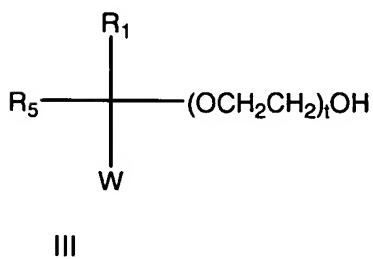
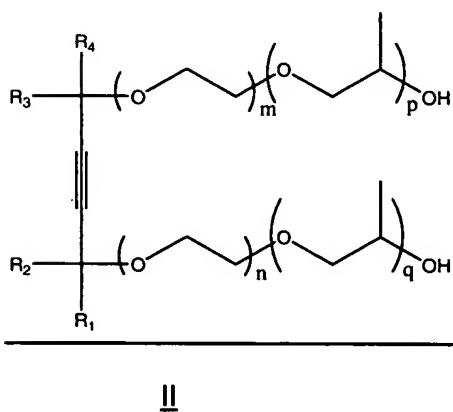
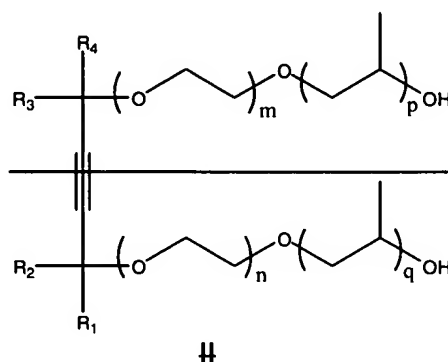
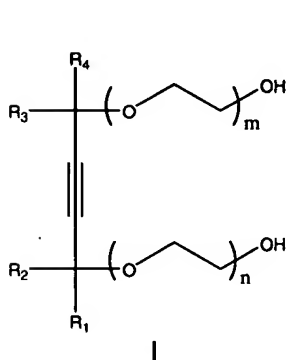
branched, or a cyclic alkyl group having from 4 to 22 carbon atoms; W is a hydrogen atom or an alkynyl group; X and Y are each independently a hydrogen atom or a hydroxyl group; Z is a halide atom, a hydroxyl group, an acetate group, or a carboxylate group; i, m, n, p, and q are each independently a number that ranges from 0 to 20; r and s are each independently 2 or 3; t is a number that ranges from 0 to 2; j is a number that ranges from 1 to 5; and x is a number that ranges from 1 to 6.

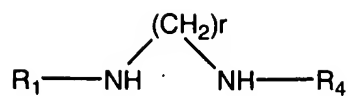
2. (Original) The method of claim 1 wherein the contacting step comprises a dynamic rinse.
3. (Original) The method of claim 1 wherein the contacting step comprises a static rinse.
4. (Original) The method of claim 1 wherein the surface of the substrate in the contacting step is wet with the developer solution.
5. (Original) The method of claim 1 wherein the surface of the substrate in the contacting step is wet with the deionized water rinse.

6. (Original) The method of claim 1 wherein the process stream is formed by injecting 10 to 10,000 ppm of the at least one surfactant into the solvent.
7. (Original) The method of claim 1 wherein the process stream is formed by applying 10 to 10,000 ppm of the at least one surfactant onto the surface of the substrate and applying the solvent to the substrate surface.
8. (Original) The method of claim 1 wherein the process stream is formed by passing the solvent through a cartridge comprising the at least one surfactant.
9. (Original) The method of claim 1 wherein a time of the contacting step ranges from 1 to 200 seconds.
10. (Original) The method of claim 9 wherein the time of the contacting step ranges from 1 to 150 seconds.
11. (Original) The method of claim 10 wherein the time of the contacting step ranges from 1 to 40 seconds.
12. (Currently Amended) The method of claim ~~40~~ 10 wherein an at least one temperature of the contacting step ranges from 10 to 100°C.
13. (Currently Amended) A method for avoiding a collapse of a developed pattern on the surface of a plurality of substrates, the method comprising:

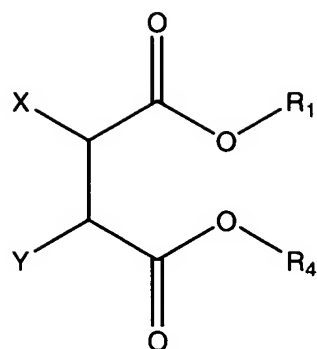
providing a first substrate comprising a photoresist pattern developed upon the surface;

preparing a process solution comprising from 10 ppm to about 10,000 of at least one surfactant having the formula (I), (II), (III), (IVa), (IVb), (V), (VI), (VII), (VIII), (IXa), (IXb), (IXc), (Xa), (Xb), (Xc), or (Xd):

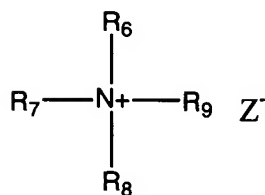




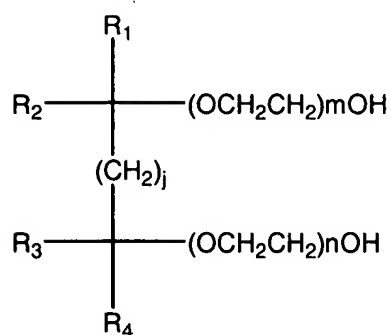
IVb



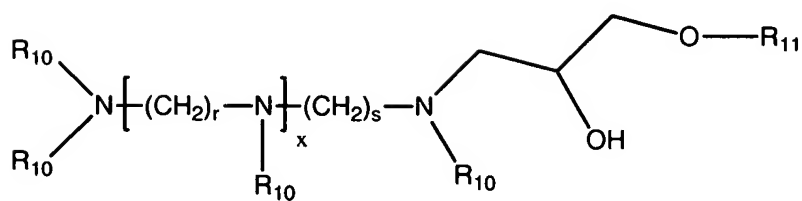
V



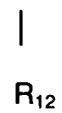
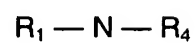
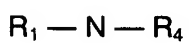
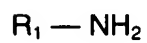
VI



VII



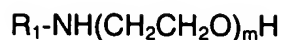
VIII



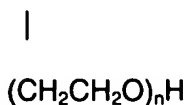
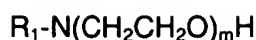
IXa

IXb

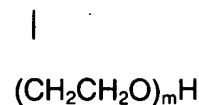
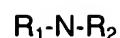
IXc



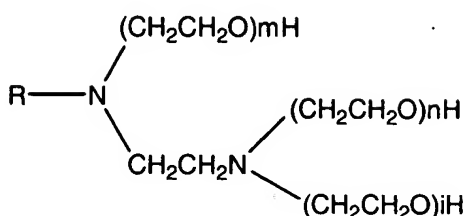
Xa



Xb

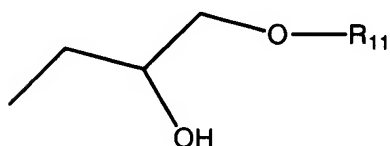


Xc



Xd

wherein R, R₁, R₄, and R₁₂ are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; R₂ and R₃ are each independently a hydrogen atom or a straight, a branched, or a cyclic alkyl group having from 1 to 5 carbon atoms; R₅ is a straight or a branched alkyl group having from 1 to 10 carbon atoms; R₆ is a straight or a branched alkyl group having from 4 to 16 carbon atoms; R₇, R₈, and R₉ are each independently a straight or a branched alkyl group having from 1 to 6 carbon atoms; R₁₀ is independently a H atom or a group represented by the formula



; R₁₁ is a straight, branched, or cyclic alkyl group having

from 4 to 22 carbon atoms; W is a hydrogen atom or an alkynyl group; X and Y are each independently a hydrogen atom or a hydroxyl group; Z is a halide atom, a hydroxyl group, an acetate group, or a carboxylate group; i, m, n, p, and q are each independently a number that ranges from 0 to 20; r and s are each independently 2 or 3; t is a number

that ranges from 0 to 2; j is a number that ranges from 1 to 5; and x is a number that ranges from 1 to 6;

contacting the first substrate with the process solution;

determining a surface tension and a contact angle of the process solution on the first substrate;

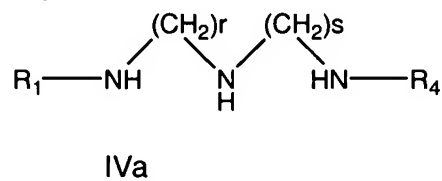
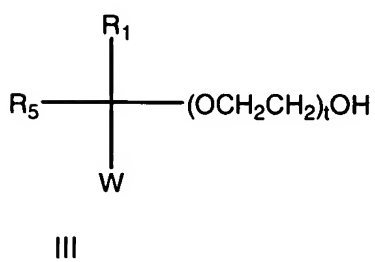
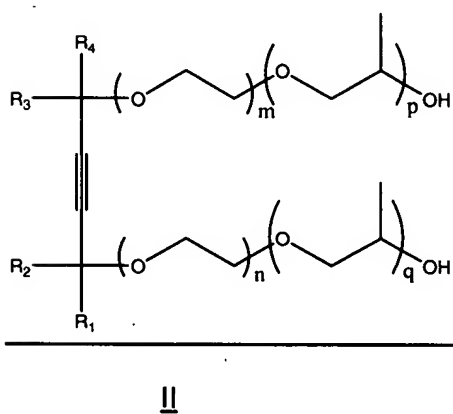
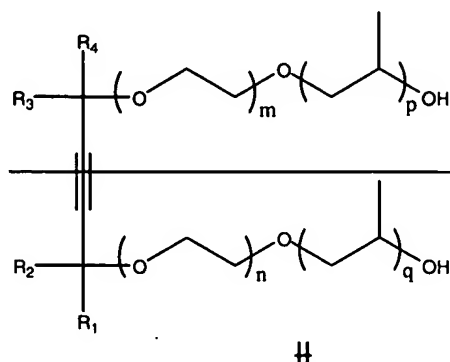
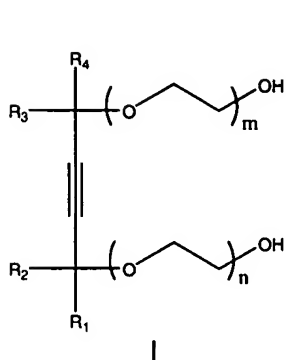
multiplying the surface tension by the cosine of the contact angle to provide the adhesion tension value of the process solution;

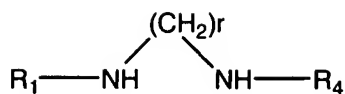
providing the plurality of substrates wherein each substrate within the plurality comprises a photoresist pattern developed upon the surface; and

contacting the plurality of substrates with the process solution if the adhesion tension value of the process solution is 30 or below.

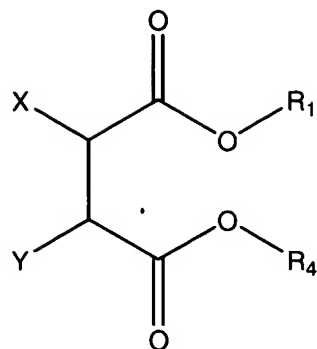
14. (Original) The process of claim 13 wherein the preparing, the first contacting, the determining, and the multiplying steps are repeated until the adhesion tension value is 30 or below.
15. (Original) The process of claim 13 wherein the surface of the plurality of substrates in the second contacting step is wet with a deionized water rinse.
16. (Original) The process of claim 13 wherein the surface of the plurality of substrates is wet with a developer solution.
17. (Currently Amended) A process rinse solution to reduce at least one defect selected from pattern collapse and line width roughness on the surface of a substrate that has been patterned and developed, the solution comprising an

aqueous solvent, a non-aqueous solvent, and at least one surfactant selected from the group of surfactants having the formula (I), (II), (III), (IVa), (IVb), (V), (VI), (VII), (VIII), (IXa), (IXb), (IXc), (Xa), (Xb), (Xc), or (Xd):

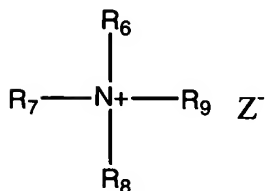




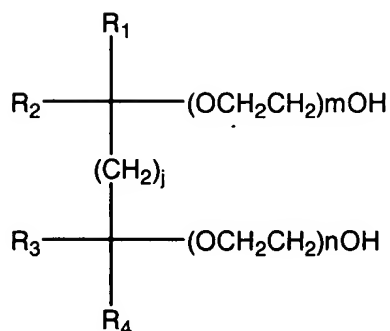
IVb



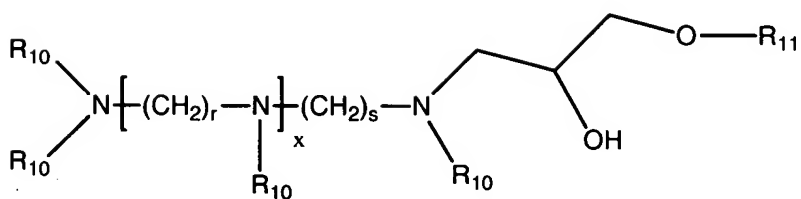
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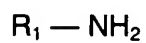
VI



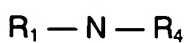
VII



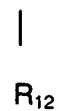
VIII



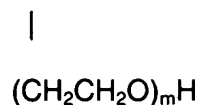
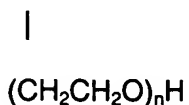
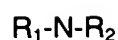
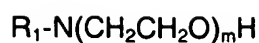
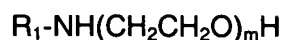
IXa



IXb



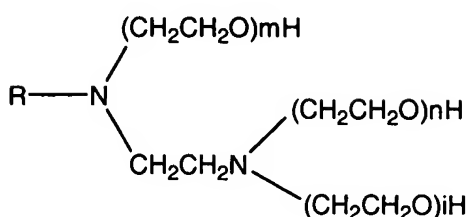
IXc



Xa

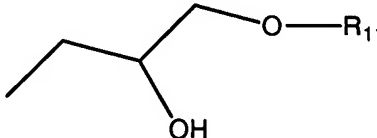
Xb

Xc



Xd

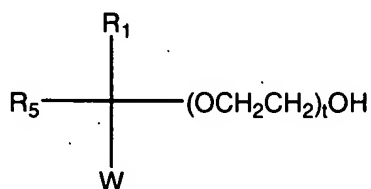
wherein R, R₁, R₄, and R₁₂ are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; R₂ and R₃ are each independently a hydrogen atom or a straight, a branched, or a cyclic alkyl group having from 1 to 5 carbon atoms; R₅ is a straight, a branched, or a cyclic alkyl group having from 1 to 10 carbon atoms; R₆ is a straight, a branched, or a cyclic alkyl group having from 4 to 16 carbon atoms; R₇, R₈, and R₉ are each independently a straight, a branched, or a cyclic alkyl group having from 1 to 6 carbon atoms; R₁₀ is a hydrogen atom or a group

represented by the formula ; R₁₁ is a straight, a

branched, or a cyclic alkyl group having from 4 to 22 carbon atoms; W is a hydrogen atom or an alkynyl group; X and Y are each independently a hydrogen atom or a hydroxyl group; Z is a halide atom, a hydroxyl group, an acetate group, or a carboxylate group; i, m, and n are each independently a number that ranges from 0 to

20; r and s are each independently 2 or 3; t is a number that ranges from 0 to 2; j is a number that ranges from 1 to 5; and x is a number that ranges from 1 to 6.

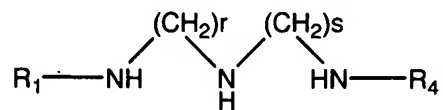
18. (Original) The process solution of claim 17 wherein the non-aqueous solvent is miscible in the aqueous solvent.
19. (Original) The process solution of claim 17 wherein the at least one surfactant is a surfactant having the following formula (III):



III

wherein R_1 is a straight or a branched alkyl group having from 3 to 25 carbon atoms; R_5 is a straight or a branched alkyl group having from 1 to 10 carbon atoms; W is a hydrogen atom or an alkynyl group; and t is a number that ranges from 0 to 2.

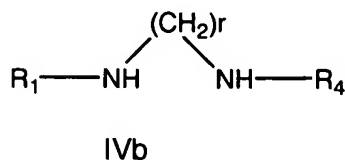
20. (Original) The process solution of claim 17 wherein the at least one surfactant is a surfactant having the following formula (IVa):



IVa

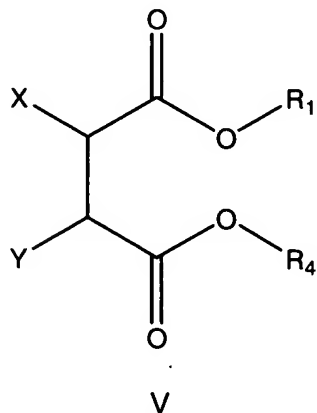
wherein R_1 and R_4 are each independently a straight or a branched alkyl group having from 3 to 25 carbon atoms and r and s are each independently 2 or 3.

21. (Original) The process solution of claim 17 wherein the at least one surfactant is a surfactant having the following formula (IVb):



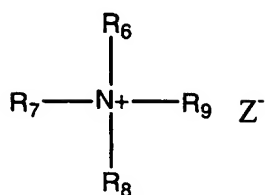
wherein R₁ and R₄ are each independently a straight or a branched alkyl group having from 3 to 25 carbon atoms and r is 2 or 3.

22. (Original) The process solution of claim 17 wherein the at least one surfactant is a surfactant having the following formula (V):



wherein R₁ and R₄ are each independently a straight or branched alkyl group having from 3 to 25 carbon atoms and X and Y are each independently a hydrogen atom or a hydroxyl group.

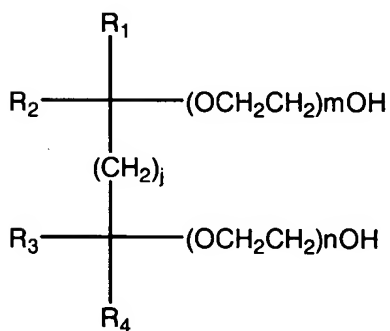
23. (Original) The process solution of claim 17 wherein the at least one surfactant is a surfactant having the following formula (VI):



VI

wherein R_6 is a straight or a branched alkyl group having from 4 to 16 carbon atoms; R_7 , R_8 , and R_9 are each independently a straight or a branched alkyl group having from 1 to 6 carbon atoms; and Z is a halide atom, a hydroxyl group, an acetate group, or a carboxylate group.

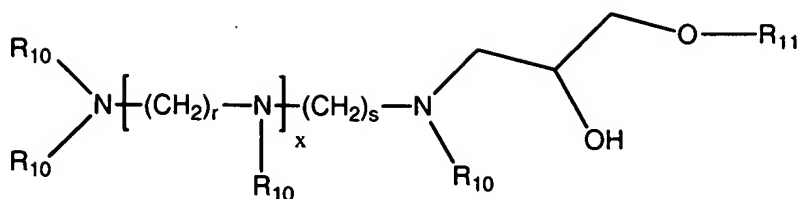
24. (Original) The process solution of claim 17 wherein the at least one surfactant is a surfactant having the following formula (VII):



VII

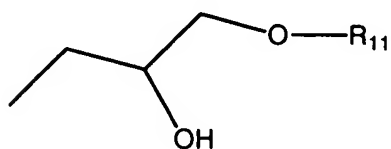
wherein R_1 and R_4 are each independently a straight or branched alkyl group having from 3 to 25 carbon atoms; R_2 and R_3 are each independently a hydrogen atom or an alkyl group having from 1 to 5 carbon atoms; m and n are each independently a number that ranges from 0 to 20; and j is a number that ranges from 1 to 5.

25. (Original) The process solution of claim 17 wherein the at least one surfactant is a surfactant having the following formula (VIII):



VIII

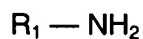
wherein R_{10} is a hydrogen atom or a group represented by the formula



; R_{11} is independently a straight, branched, or cyclic alkyl

group having from 4 to 22 carbon atoms; r and s are each independently 2 or 3; and x is a number that ranges from 1 to 6.

26. (Original) The process solution of claim 17 wherein the at the at least one surfactant is a surfactant having the following formula (IXa):



IXa

wherein R_1 is a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms.

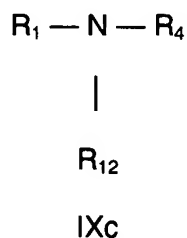
27. (Original) The process solution of claim 17 wherein the at the at least one surfactant is a surfactant having the following formula (IXb):



IXb

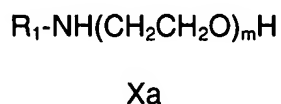
wherein R_1 and R_4 are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms.

28. (Original) The process solution of claim 17 wherein the at the at least one surfactant is a surfactant having the following formula (IXc):



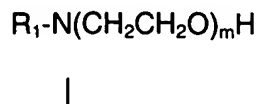
wherein R_1 , R_4 , and R_{12} are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms.

29. (Original) The process solution of claim 17 wherein the at the at least one surfactant is a surfactant having the following formula (Xa):



wherein R_1 is a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; and m is a number that ranges from 0 to 20.

30. (Original) The process solution of claim 17 wherein the at the at least one surfactant is a surfactant having the following formula (Xb):

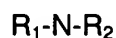




Xb

wherein R_1 and R_2 are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; and m and n are each independently a number that ranges from 0 to 20.

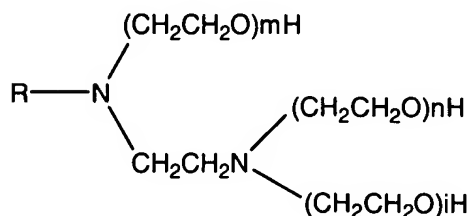
31. (Original) The process solution of claim 17 wherein the at the at least one surfactant is a surfactant having the following formula (Xc):



Xc

wherein R_1 and R_2 are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; and m is a number that ranges from 0 to 20.

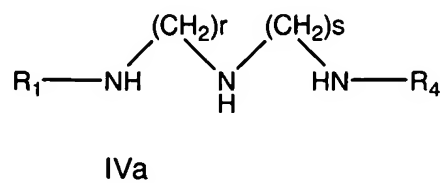
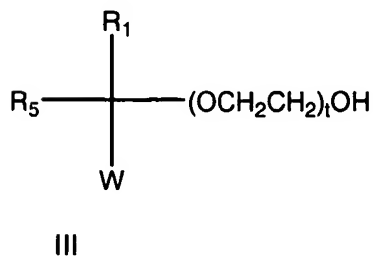
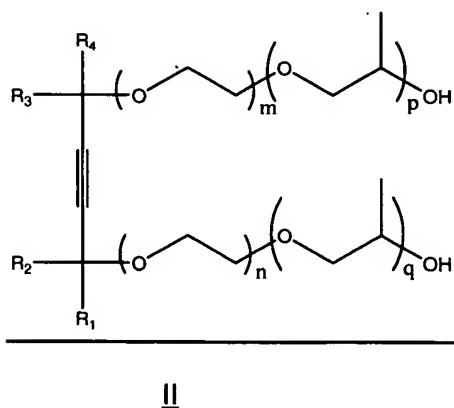
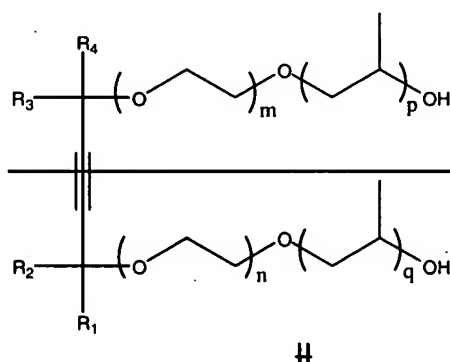
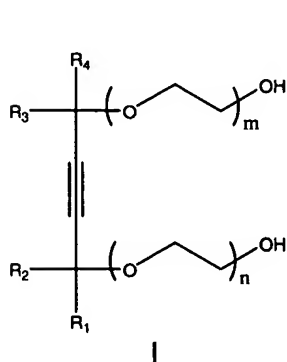
32. (Original) The process solution of claim 17 wherein the at the at least one surfactant is a surfactant having the following formula (Xd):

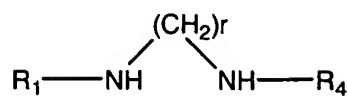


Xd

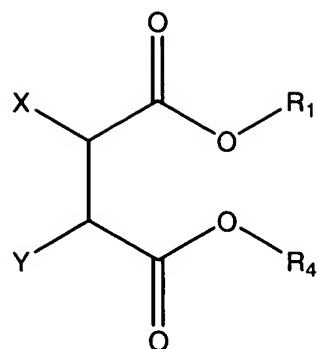
wherein R is independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; and i , m , and n are each independently a number ranging from 0 to 20.

33. (Currently Amended) A method of reducing pattern collapse defects on the surface of a patterned and developed substrate comprising: contacting the substrate with a process solution comprising an aqueous solvent, a non-aqueous solvent, and at least one surfactant having the formula (I), (II), (III), (IVa), (IVb), (V), (VI), (VII), (VIII), (IXa), (IXb), (IXc), (Xa), (Xb), (Xc), or (Xd):

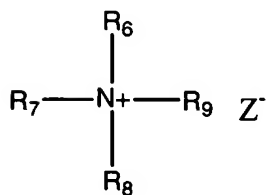




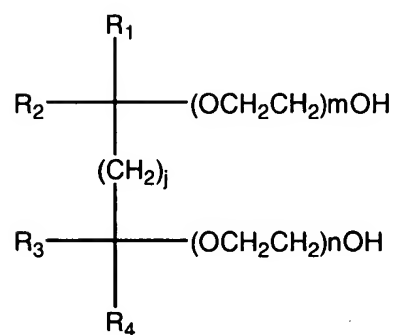
IVb



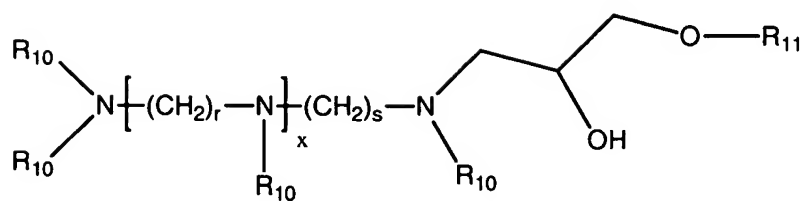
V



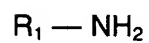
VI



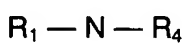
VII



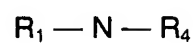
VIII



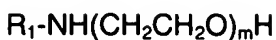
IXa



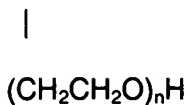
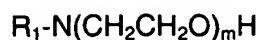
IXb



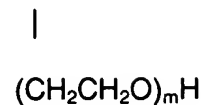
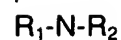
IXc



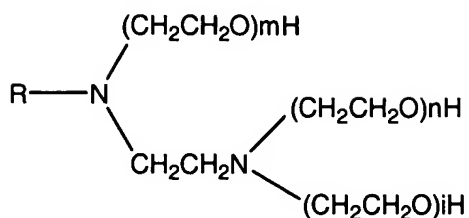
Xa



Xb

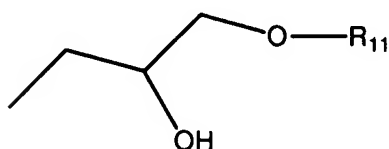


Xc



Xd

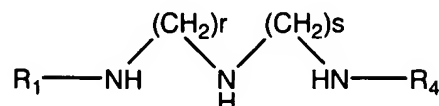
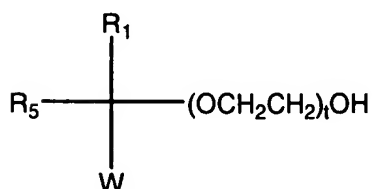
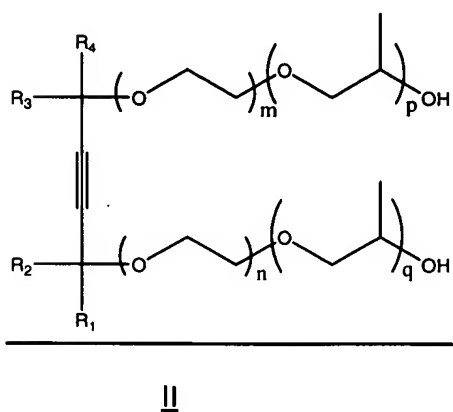
wherein R, R₁, R₄, and R₁₂ are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; R₂ and R₃ are each independently a hydrogen atom or a straight, a branched, or a cyclic alkyl group having from 1 to 5 carbon atoms; R₅ is a straight, a branched, or a cyclic alkyl group having from 1 to 10 carbon atoms; R₆ is a straight, a branched, or a cyclic alkyl group having from 4 to 16 carbon atoms; R₇, R₈, and R₉ are each independently a straight, a branched, or a cyclic alkyl group having from 1 to 6 carbon atoms; R₁₀ is a hydrogen atom or a group represented by the formula



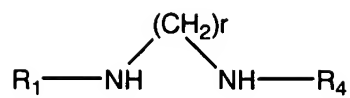
; R₁₁ is a straight, a branched, or a cyclic alkyl group having

from 4 to 22 carbon atoms; W is a hydrogen atom or an alkynyl group; X and Y are each independently a hydrogen atom or a hydroxyl group; Z is a halide atom, a hydroxyl group, an acetate group, or a carboxylate group; i, m, and n are each independently a number that

34. (Currently Amended) A method of reducing line width roughness defects on the surface of a patterned and developed substrate comprising: contacting the substrate with a process solution comprising an aqueous solvent, a non-aqueous solvent, and at least one surfactant having the formula (I), (II), (III), (IVa), (IVb), (V), (VI), (VII), (VIII), (IXa), (IXb), (IXc), (Xa), (Xb), (Xc), or (Xd):

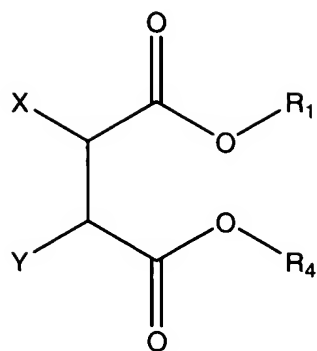


III

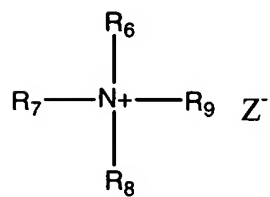


IVb

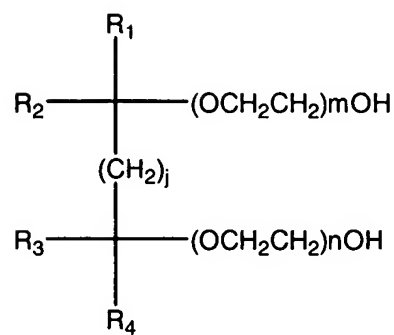
IVa



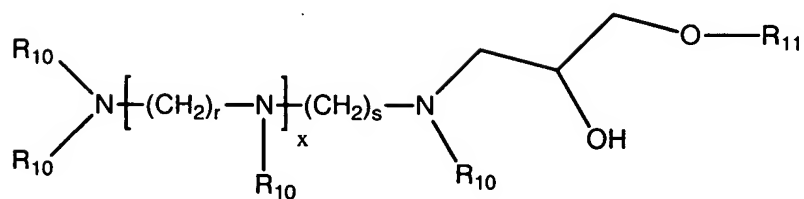
V



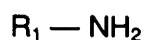
VI



VII



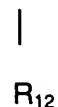
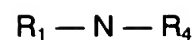
VIII



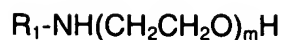
IXa



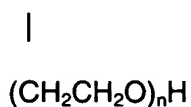
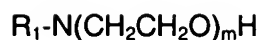
IXb



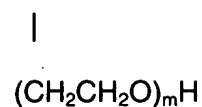
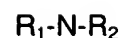
IXc



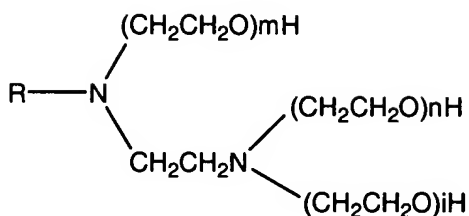
Xa



Xb

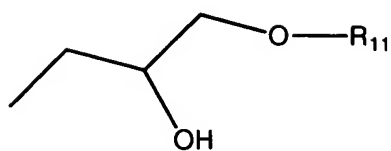


Xc



Xd

wherein R, R₁, R₄, and R₁₂ are each independently a straight, a branched, or a cyclic alkyl group having from 3 to 25 carbon atoms; R₂ and R₃ are each independently a hydrogen atom or a straight, a branched, or a cyclic alkyl group having from 1 to 5 carbon atoms; R₅ is a straight, a branched, or a cyclic alkyl group having from 1 to 10 carbon atoms; R₆ is a straight, a branched, or a cyclic alkyl group having from 4 to 16 carbon atoms; R₇, R₈, and R₉ are each independently a straight, a branched, or a cyclic alkyl group having from 1 to 6 carbon atoms; R₁₀ is a hydrogen atom or a group represented by the formula



; R₁₁ is a straight, a branched, or a cyclic alkyl group having from 4 to 22 carbon atoms; W is a hydrogen atom or an alkynyl group; X and Y are each independently a hydrogen atom or a hydroxyl group; Z is a halide atom, a hydroxyl group, an acetate group, or a carboxylate group; i, m, and n are each independently a number that ranges from 0 to 20; r and s are each independently 2 or 3; t is a number that ranges from 0 to 2; j is a number that ranges from 1 to 5; and x is a number that ranges from 1 to 6.